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AUTHOR Jelinek, James John
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ABSTRACT

Whereas rigorous quantitative methods (in experimental methods, data interpretation, concept formation, hypothesis construction) and formal style and format are essential in theory verification research, their applicability centers on the fact that in theory verification research, it is necessary to determine whether the strategies used for collecting, coding, analyzing, and presenting data were instrumental in influencing explanations and hypotheses inherent in a developing theory. For example, in the Behavior Control Perception Theory (BCP), William T. Powers proposes that the response defines the stimulus as organisms seek to control their incoming sensory data. In humans, the brain acts as a control system which interprets the real world in such a way that it comes as close as possible to matching the personal, internal world. Discrepancies between what one senses and wants to sense generate an error signal, which in turn activates behavior. Humans try as many behaviors (outputs) as possible to control the input so that it corresponds to what they want. This need-satisfying behavior system is composed of three parts: (1) reorganization--random, unlearned and energetic enough to produce behaviors until the error signal is reduced or eliminated; (2) redirection--a system of learned behaviors and strategies to reduce error; and (3) new information--used on small transient error signals. The conclusion is that educational researchers will make progress in closing the gap between theory and empirical research if they concentrate on examining the basic assumptions about stimulus and response upon which their work is based. (AM)

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A RECONSTRUCTED THEORY OF EDUCATIONAL RESEARCH.

1981

DR. JAMES JOHN JELINEK, EMERITUS PROFESSOR OF EDUCATION, COLLEGE OF EDUCATION, ARIZONA STATE UNIVERSITY, TEMPE, ARIZONA, 85287.

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THE ROCKY MOUNTAIN EDUCATIONAL RESEARCH ASSOCIATION, DALLAS, TEXAS, 75228.

1.

The conclusions we come to, the emotions we harbor, and the passions that sway us, are of much less significance than the basic assumptions upon which they are all founded. We in educational research have proceeded much too long without examining certain of the basic assumptions upon which our work has been founded, and for this reason we have done a disservice to ourselves and to those we serve.

The Emphasis on Research for the Verification of Theory.

Even since Herbert Blumer (3) first alluded to the gap between theory and empirical research in 1941 and Barney G. Glaser and Anselm L. Strauss did so again in 1967, we have done little or nothing to examine the basic assumption of all research concerned with how accurate facts can be obtained and how theory can thereby be more rigorously generated. That assumption has been that the stimulus defines the response.

Educational researchers have resolutely continued to focus on empirical studies and on their efforts to improve the methodology of rigorous quantitative verification on such issues as sampling, coding, reliability, validity, indicators, frequency distributions, conceptual formulations, hypothesis construction, and presentation of evidence. The result has been a primary emphasis on verification of theory to the virtual exclusion of generation of theory, a primary emphasis on quantitative data to the virtual exclusion of qualitative data, and a primary emphasis on the concept of man as an automaton to the exclusion of the concept of man as an autonomous being.

The Need for Research for the Generation of Theory.

In these terms it is widely agreed that valid educational research on verification of theory requires that one establish fixed experimental conditions, manipulate one or several variables, and observe the consequent effects on behavior. Running throughout educational research (and almost identical to what is termed "scientific method") is a particular concept of cause and effect. The cause, the immediate physical cause of what the organism does, lies outside the organism; the best the organism can do is to modulate the connection from the stimulus

that is the cause to the behavior that is the effect. This basic stimulus-response model of how sensory events act on the brain to produce or change behavior remains, in all but technological details, the same as it was when Descartes first presented it three hundred years ago. (5) Research designed for the verification of theory is of critical importance, but we need desperately to address ourselves to the equally important enterprise of doing research specifically designed for the generation of theory from data -- data systematically obtained and analyzed in educational research. (8)

The assumption has been that education has been embarked on a straight-line course of progress toward becoming a science by virtue of quantitative verification of hypotheses. Early in the 1900s educational research workers began following the lead of John Watson. (24) Watson wanted to eliminate all the reification, all the empty language that characterized research and to put in its place an experimental approach modeled after that of physics in which only that which was publicly observable would be admitted as evidence. Ultimately all behavior, he said, would be explainable by the stimulus-response approach. By studying the effects of controlled objective stimuli on the objectively observed actions of animals and people, he and most other educational research workers since his time, planned to derive laws of behavior, generalizations from many individual observations, that would then be used to predict the behavior that would follow from any given stimulus. This approach has caused an arrestment in educational research of inestimable proportions.

Cause and effect from stimulus to sensory receptor, and from muscle tension to the eventual behavior, does not exist. It is an hypostatization, an assumption, a glittering generality for which there is no referent in the real world.

It is not true that a stimulus that results in a regular behavioral result always acts on the nervous system in the same way. It is not true that a stimulus which acts on the nervous system in a consistent way always produces the same behavioral result. It is not true that a given set of muscle tensions always produces the same observable behavior. It is not true that when a given observable behavior repeats, the muscle tensions that cause it are the same every time. (25:5)

Researchers have doggedly persisted in placing primary research emphasis upon the verification of theory, rather than the generation of theory even in full view of exceptions to their basic assumptions. Instead of cherishing the exceptions they have found in their experimental subjects and pursuing research for the generation of theory on the basis of them

they have instituted statistical gamesmanship to gloss over exceptions in behavior. The behavior of the pigeon that correctly identifies uncapped bottles by pressing a lever ninety-nine times but does not do so on the one-hundredth trial, the behavior of the rat that makes the correct turn forty-nine times to obtain its food, but makes the wrong turn on the fiftieth trial, the behavior of the trainee that performs perfectly for twenty-nine days, but forgets his instructions on the thirtieth day, the behavior of the student with an intelligence quotient of 190 who flunks out of school, are all behaviors, the exceptional phases of which are rationalized away by t-tests, chi square tests, regression calculations, and all the other complex contrivances of statistics that doctoral students must learn these days, instead of learning to cherish the exceptions they discover and instead of learning how to generate theory on the basis of them. "Significance," in modern-day educational research, means something other than "importance." (17:185-191)

Despite the scarcity of research studies devoted to the generation of theory, there are nonetheless several noteworthy theories that have been generated from data systematically obtained. Not the least of these include (a) Howard S. Becker, et al, Boys in White, (1) (b) Barney G. Glaser and Anselm L. Strauss, Awareness of Dying, (7) (c) Barney G. Glaser and Anselm L. Strauss, "The Social Loss of Dying Patients," American Journal of Nursing, (9) (d) James Coleman, The Adolescent Society, (4) (e) Robert Blauner, Alienation and Freedom, (2) (f) William T. Powers, Behavior: The Control of Perception. (21)

Guidelines for doing research on the verification of theories abound in our professional literature -- Carter V. Good, Essentials of Educational Research, (12) Fred N. Kerlinger, Foundations of Behavioral Research: Educational and Psychological Inquiry, (20) Carter V. Good and Douglas E. Scates, Methods of Research: Educational, Psychological, Sociological, (11) not to mention my own books, Fundamentals of Educational Research (15) and Educational Research Methods. (14)

Guidelines for Research on the Generation of Theory.

Not so well known are the guidelines for research on the generation of theory, some of which include the following:

It is the task of theory to develop the perfecting and extending of knowledge -- to enhance effective intelligence. Effective intelligence, as such, is behavior that is guided by an anticipation of consequences. In these terms, theory is generated from data -- data systematically obtained and analyzed in research. Educational research generating theory goes hand in hand with verifying it, but most research workers in education have been diverted from this guideline in their zeal to test either existing logico-deductive, conjectural, speculative theories or theories they have barely started to generate. As a result they study, restudy, and study again matters that have little or nothing to do with the ever-changing problems of modern education. Theory in education is a strategy for handling data in research, providing modes of conceptualization for describing and explaining. It provides clear enough categories and hypotheses so that crucial ones can be verified in present and future research and be operationalized when substantiated. A theory is readily applicable to the data under study and meaningfully relevant to explain the behavior under study. In this sense it is not logico-deductive, speculative, or conjectural. Because it is generated from data, and because it cannot be divorced from the process by which it is generated, theory is usually long-lasting, despite its inevitable modification and reformulation. (17:111-120)

Generating a theory from data means that its hypotheses and concepts not only come from the data, but are systematically worked out in relation to the data during the course of the research. Thus, generating theory is a process, a process of research.

Those who use research to generate educational theories are obliged to tell what use their theories are in anticipating consequences and what applications, explanations, and procedures led to their suggested hypotheses.

Each form of data, whether qualitative or quantitative, is useful for both verification and generation of theory, whatever the primacy of emphasis. Both forms are used as supplements, as different forms of data on the same subject, which, when compared, will generate theory. The process of generating theory is independent of the data used. Library research, field research, and laboratory research are all respectable sources for the generation of theory. Be that as it may, the qualitative method is often found to be best for research used in generating theory for the reason that it is best for obtaining data on structural conditions, consequences, deviances, norms, processes, patterns, and systems. (4)

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A research worker formulates theory by generating conceptual categories or their properties from evidence, and then uses the evidence from which the category emerged to illustrate the concept. A concept is a general class with examples of that class linked by some common element or relationship. Concept formation is the process of abstracting a class with common attributes. Concept formation is the central component in the study of cognitive development, language acquisition, thinking, and problem solving. (6)

Researchers who generate theory focus clearly on how their theory emerged; they explore systematically how they generated it and how they obtained its conceptual generality and scope. A focus on testing and verification easily blocks the generation of an integrated and profound theory.

The form in which the verification of theory is written is seemingly of considerable importance. Manuals of form become the bedside companions of doctoral students whose dissertations are designed for testing and verifying hypotheses. This is not the case for workers in doing research for the generation of theory. The form in which a theory is presented does not make it a theory; it is a theory because it explains or predicts something. Theory can be presented either as a well-codified set of propositions or as a running theoretical discussion using conceptual categories and their properties.

There are two basic types of theory: Substantive theory is developed for an empirical area of educational inquiry. Formal theory is developed for a conceptual area of educational inquiry. Substantive and formal theories exist on distinguishable levels of generality, which differ only in terms of degree. Both theories are grounded in data.

The basic areas of theory are, first, conceptual categories and their conceptual properties, and, second, hypotheses or generalized relations among the categories and their properties. The main purpose in the verification of theory is to establish relatively few uniformities and variations on a conceptual level. The main purpose in the generation of theory is to obtain much diversity in emergent categories, synthesized at as many levels of conceptual and hypothetical generalization as possible. This approach used in the generation of theory is much more conducive to the formulation of suggested hypotheses.

There is no way a formal model can be applied to a theory generated from data, to force it into becoming an integrated theory. The integration of the theory emerges, just as did the concepts inherent in it. This again is a distinctive difference between research for the verification

of theory as opposed to research for the generation of theory.

In research for the verification of theory, an adequate sample is based on strict statistical rules of random and stratified random sampling. In research for the generation of theory, an adequate sample is determined at the point of a category's theoretical saturation, the point at which no additional data are being found whereby the researcher can develop further properties of the category. Sampling for the generation of theory is thus an active, purposeful way of collecting data as opposed to the boring, dull, and stultifying effects on creativity of the methods used for the verification of theory -- separate and routine data collection, coding, and analysis.

Statistical tests of significance used in research on the verification of theory concerning an association between variables are not necessary when the discovered associations are used for suggesting hypotheses. These tests direct attention away from theoretically interesting relationships that are not of sufficient magnitude to be statistically significant. In other words, weak associations may be highly relevant theoretically.

Summary of Guidelines on Research.

In summary, then, research for the verification of existent theories relies on the canons of dogmatically rigorous quantitative verification in sampling, coding, reliability, validity, indicators, frequency distributions, conceptual formulation, hypothesis construction, and rigidly formal style and format of presentations, all of which are memorized by doctoral students and then carved in stone lest they forget one or two of them.

On the other hand, research pursued for the generation of theory raises many serious doubts about the applicability of the dogmatically rigorous canons of verification research as being adequate criteria for judging the credibility of theory based on flexible research. Criteria of judgment applied to research for the generation of theory are based instead on whether the actual strategies used for collecting, coding, analyzing, and presenting data were instrumental in the emergence of the problems, explanations, and hypotheses inherent in an ever-developing, integrated theory.

An Exemplar of the Generation of Theory.

In my judgment the most profound generation of a theory based on these guidelines has been done by William T. Powers. His theory is called Behavior: The Control of Perception, BCP. At this point it is with some reluctance that I recommend it to you as an example of theory generated from research data. As Powers himself says, "It is a long way through this theory, both in words and in new concepts." (21:xi) After studying Powers' theory for a long time, Dr. William Glasser (10) asked Powers if he would work with him to write the book entitled Stations of the Mind for use by the layman. With the help of Glasser I should like to identify some of the highlights of Powers' theory and modestly suggest that you review a less complicated theory I myself have generated on the basis of extensive research -- A Curriculum Theory for the Development of Maturity in Students. (13)

Contrary to Watson,(24) Skinner, (22) and the neo-behaviorists (17:171-184) who state that the stimulus defines the response, Powers states that the response defines the stimulus. "Behavior," he says, "is the process by which organisms control their input sensory data. For human beings, behavior is the control of perception." (21:xi)

In these terms, man is driven by powerful internal forces that move him not only to survive, but move him toward belonging, worthwhileness, fun, freedom, and so on. From these and perhaps other basic needs, he constructs a complex, unique personal world. His brain acts as the control system that deals with the real world to try to control it, so that it comes as close as possible to his personal world. What happens in the real world is of little or no significance to man unless it relates to what is already inside him in his personal world.

The brain controls for input or for what it senses. All brain control systems, like a thermostat, have sensors that provide accurate sensing capability. Man has the ability to sense light, sound, odor, flavor, touch, heat, cold, and pain. He has sensors that provide much information that goes into his brain, information that is called input.

When there is a difference between what man wants to sense and what he does sense, that difference generates a signal that activates his behavior.

Man has a wide variety of outputs or behaviors. When he doesn't get the input for which he is controlling he tries one behavior after another. An input control system uses all the outputs it has available, and the more it has, the better it is at controlling for what it wants.

This is not what most professional and lay persons believe. Most, especially the behaviorists, believe they control for output, not input. In terms of stimulus-response theory they believe they can do things to individuals to get them to behave differently. They ignore, or try to ignore, that man is internally motivated.

When man wants anything, when his brain control system is controlling for anything, it does so by sending that perception to an active comparing station. There his perception of what he wants from his internal world is compared with whatever perceptions are coming through his senses, his input systems, from the external world.

The perception system contains all the sensory receptors, but it does much more than sense. It also interprets what man senses, from simple to complex, through at least ten orders -- I. Intensity, II. Sensation, III. Configuration, IV. Transition, V. Sequence, VI. Relationship, VII. Program, VIII. Principles, IX. System Concepts, X. Universal oneness -- Meditation.

In a comparing station in his brain, man is constantly comparing what is coming in with some of his built-in needs. When what is coming in does not compare very well, we have what is called an uncontrolled perception, a perceptual error which is the difference between the reference perception and the input. A perceptual error always generates a signal called an error signal that activates the behavioral system to eliminate the error. The behavior is made up of all that man thinks, does, and feels. This input-control system functioning is called Behavior Control Perception theory, BCP, in contrast to Stimulus-Response theory, S-R.

Man has a three-component behavioral system to provide him with the behaviors he uses to satisfy his needs, one major system -- reorganization and redirection, and one subsystem -- new information.

The reorganization system is a random, illogical, nonlearning, but highly energetic system that produces behavior until the perceptual error is reduced or eliminated so that reorganization is no longer needed.

Soon after birth man develops the second component of his behavioral system -- redirection. Unlike reorganization, redirection is a learning

system. It becomes a storehouse of learned behaviors and strategies that reduce or eliminate perceptual error.

The third component of man's behavioral system -- the new information system -- is used to deal with small perceptual errors. It simply eliminates transient errors with new information.

Summary of the Exemplar.

In summary, then, the theory of Behavior Control Perception, BCP, postulates the following:

Man always lives in two worlds, his personal world, over which, once he learns it is his personal world, he has much control, and something called the real world, over which he has much less control.

All man ever knows of the real or external or outside world is the energy that comes from the world and strikes the sensory receptors of his perceptual system. Everything else that man claims is the real world is in fact his own perceptions of that world, perceptions he constantly tries to change so that they coincide with the world in his head.

Man dissipates much of his strength in attempting to control others, strength that he urgently needs to compromise and negotiate, to ratify his needs and those of others.

Conclusion.

This, then, concludes my brief review of the highlights of the theory by William T. Powers entitled BCP, Behavior Control Perception, a theory quite contrary to the Stimulus-Response theory of B. F. Skinner. (21) (22)

To those young and old in our profession who live in awe of the classical theorists, the generation of theory might indeed seem to be an overwhelming undertaking. I would remind them that the prudent person chooses goals he can easily attain, and rots in the contentment of shallow accomplishments; the wise person chooses goals he can never completely attain and lives in the realm of splendid failure.

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